

REMARKS/ARGUMENTS

Claims 16-30 are currently pending in the present application.

Claims 16-30 are rejected under 35 U.S.C. § 112, first and second paragraphs.

Applicants thank Examiner for allowing the proposed drawing correction and amendments submitted December 11, 2003.

Otherwise, Applicants respectfully traverse all claim rejections for the following reasons:

I. EXAMINER'S INTERVIEW

Applicants conducted an interview with the Examiner to discuss the Final Office Action dated March 2, 2004. Applicants stressed that the "converter" recited within the context of claims 16-20 (i.e., a "converter" operable to convert at least one of the speed into torque, and the torque into speed) is well known in the art and, as such, the § 112, first paragraph, rejections of claims 16-20 should be withdrawn. The Examiner requested that Applicants provide support for this assertion.

II. REJECTIONS OF CLAIMS 16-30 UNDER 35 U.S.C. § 112, FIRST PARAGRAPH

Claims 16-30 are rejected under 35 U.S.C. § 112, first paragraph for allegedly containing "a converter" which was not described in the specification in such a way as to reasonably convey to one skilled in the art, at the time the application was filed, that the inventor had possession of a "converter operable to convert at least one of the speed of the rotor into torque, and the torque of the rotor into speed." Respectfully, Applicants traverse because such converter devices are well known within the art of motor design.

Prior art devices within the relative art, and previously relied upon by Examiner in regard to this application, provide repeated detailed descriptions of the operational and physical features of a "converter unit" as described in claims 16-30. For example, United States Patent No. 5,823,280 to Lateur et al. (hereinafter "Lateur") recites a "power controller represented at 16." (Lateur, col. 3, lines 29-30). The power controller 16 includes a plurality of power semiconductor switching devices, for example power MOSFETs or IGBTs." (Lateur, col. 3,

lines 41-43). “Whenever acceleration is desired, power controller 16 changes the commutation of the motor/generators 12, 14 as appropriate to increase torque and to change the relative rotational speed of the first and second rotors 58, 60 to achieve a higher rotational speed for the output shaft 62.” (Lateur, col. 7, lines 3-8). Similarly, whenever deceleration is desired, power controller 16 changes the commutation phasing of first and second motor/generators 12, 14 to apply a torque to output shaft 62 counter to its direction of rotation and to change the relative rotational speed of the first and second rotors 58, 60 to achieve a lower rotational speed.”(Lateur, col. 7, lines 8-14). The initial speed and torque of first rotor 58 are maintained by controlling the switching characteristics within power controller 16.” (Lateur, col. 8, lines 39-41; col. 9, lines 20-25; col. 10, lines 12-20, 40-43; col. 11, lines 2-4).

Similarly, United States Patent No. 5,517,401 to Kinoshita et al. (hereinafter “Kinoshita”) recites an inverter that converts between speed and torque by using “semiconductor power switching devices such as MOSFETs . . . as the power switching devices.” (Kinoshita, Abstract). “Driving of wheels is accomplished by driving the motor by the power converter.” (Kinoshita, col. 9, lines 58-59). “The power converter 81 is connected, on the one hand, to the main battery 1 via DC wires 12 and a main switch, and on the other hand, to the motor via AC connecting wires 85.” (Kinoshita, col. 2, line 66 to col. 3, line 2). Various embodiments are provided in which the inverter is mounted in a wheel well or integrated with the power train as an integral structure, (Kinoshita, col. 10, lines 31-40). Kinoshita further teaches that the “power MOSFET used as the power switching devices . . . exhibits approximately resistive characteristics.” (Kinoshita, col. 7, line 67 to col. 8, line 2).

The importance of such resistive characteristics is evident in United States Patent No. 3,925,695 to Raby (hereinafter “Raby”), which recites an “improved rotor resistor and cooling fan assembly for wound rotor induction motors.” (Raby, col. 1, lines 6-8). Therein, it is disclosed that:

[i]n the field of the present invention, it is well known that an increase of resistance in the rotor circuit of an A.C. induction motor varies the motor out put torque and speed characteristics. The higher rotor resistance increases the motor slip characteristic which determines the torque developed by an induction motor at a given motor speed. Increasing the slip

characteristic accordingly increases the output torque of the motor at starting or low rotor speeds.” (Raby, col. 1, lines 9-17).

Additionally, it is respectfully submitted that the Specification adequately describes a structural connection between the motor rotor and the converter which would allow for speed/torque conversion. For example, with respect to an example embodiment, the Specification recites that “[a] large number of embodiments **are known** for the design configuration and construction of electrical drives for vehicles . . . using a transverse shaft structure . . . [and having] “at least one converter unit . . . provided in order to drive the electrical machine.” (Spec., p. 1, line 8 through p. 2, line 24). “[C]onverter units determine the magnitude of the torque and rotation speed which can be delivered from the rotor of the electrical drive machine.” (Spec., p. 1, line 25 through p. 2, line 1).

In the simplest case, a converter unit comprises at least one diode rectifier device. This may in turn have arms in which a number of diodes are connected in parallel and/or in series. In this case, diodes of the same type are preferably used. **Reference should be made to the configurations of converter units, in particular inverter units.** (Spec., p. 13, lines 11-18).

Additionally, various embodiments consisting of different converter/motor connections for driving the rotor are described with reference to the relevant art in the present application. For example, with reference to another example embodiment, the converter “can be arranged at any desired distance from the electrical machine, within the vehicle.” (Spec., p. 2, lines 23-24).

In the simplest case, both - the shaft train or rotation/torque conversion or transmission device, in particular their connecting shaft, and the input or output drive shaft of the electrical machine - each have a flange-like end region, in which case the two flange-like end regions can be coupled to one another with an interlock and/or force fit. However, configurations with coupling or clutch devices are also feasible. (Spec., p. 9, line 21 through p. 10, line 1).

In yet another example embodiment, “the electrical drive machine 4 has at least one associated converter unit 11 for drive purposes . . . [and] the converter unit 11 is either

arranged directly on the electrical machine 4 or is integrated in it, and hence, together with this electrical machine, forms a physical unit.” (Spec., p. 17, lines 15-22). Provided is an “electrical coupling” as may be necessary, “preferably in the form of screw connections. The essential feature is that there is always an electrical connection. (Spec., p. 11, lines 21-26). Additionally, “it is possible to connect the converter unit mechanically to the electrical machine.” Variants include, interlocking, force-fitting, [and] integral material connection.” (Spec., p. 12, lines 1-6). “[A]n electrical screw connection at the same time allows mechanical coupling between the electrical machine and the converter unit associated with it.” (Spec., p. 12, lines 14-16).

At least Lateur, Kinoshita and Raby teach a person skilled in the art that a converter is operable toward torque/speed conversion, and teaches the manners in which it is potentially interconnected with a rotor in support of the instant application. For at least the forgoing reasons, it is respectfully submitted that Applicants reference in the instant application to inductors and converters known in the art supports the recitation in Claim 16 of a “power converter unit operable to convert at least one of the speed of the rotor into torque, and the torque of the rotor into speed” sufficiently for an ordinary practitioner in the art to understand the invention. Furthermore, it is respectfully submitted that the specification, including references to known art, teaches a structural connection between the motor and the converter which would allow such a “conversion”. Accordingly, it is kindly requested that rejection of claim 16 under 35 U.S.C. § 112, first paragraph, be withdrawn. Furthermore, since claims 17 through 30 ultimately depend from claim 16, it is respectfully submitted that these claims are also allowable under 35 U.S.C. § 112, first paragraph, for at least the same reasons.

III. REJECTIONS OF CLAIMS 16-30 UNDER 35 U.S.C. § 112, SECOND PARAGRAPH

Claims 16-30 are rejected under 35 U.S.C. § 112, second paragraph for allegedly failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Respectfully, Applicants traverse.

As provided in the prior art and referenced in the instant application, speed and torque of the rotor are maintained by controlling the switching characteristics within the power



Converter. A typical power converter in the form of MOSFET used as the power switching devices exhibits approximately resistive characteristics whereby an increase of resistance in the rotor circuit of an A.C. induction motor varies the motor out put torque and speed characteristics. It is the variance in these characteristics, the trade off of torque for speed, or vice versa, that is being claimed in claim 16 as the operability of the power converter.

For at least the foregoing reasons, it is respectfully submitted that the metes and bounds of claims 16-20 are clearly defined and are not indefinite. Accordingly, it is kindly requested that rejection of claim 16 under 35 U.S.C. § 112, second paragraph, be withdrawn. Furthermore, since claims 17 through 30 ultimately depend from claim 16, it is respectfully submitted that these claims are also allowable under 35 U.S.C. § 112, second paragraph, for at least the same reasons and, as such, the respective rejections should be withdrawn.

IV. CONCLUSION

For at least the foregoing reasons, it is respectfully submitted that all claims are in allowable condition. Reconsideration and allowance of all pending claims are therefore earnestly solicited.

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